even function

$f(x) = f(x)$

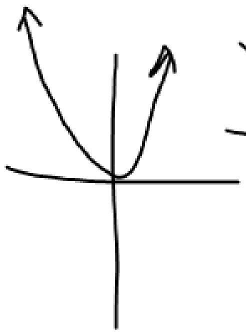
even $f(-x) = f(x)$

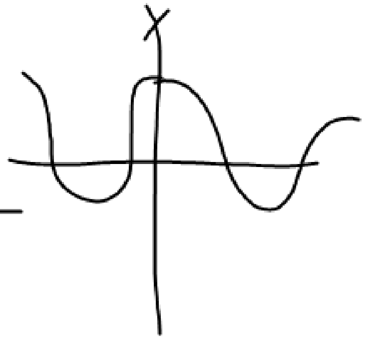
$f(x) = x^2$

$f(2) = 2^2 = 4$

$f(-2) = (-2)^2 = 4$

Symmetric across y-axis





odd

$f(x) = f(x)$

$f(-x) = -f(x)$

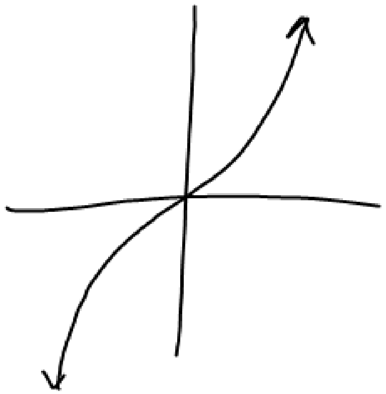
$\sin(-30) = -\sin(30)$

$f(x) = x^3$

$f(2) = 8$

$f(-2) = (-2)^3 = -8$

Symmetrical through origin



49. $\cot\theta \sin\theta$

$\downarrow$

$\frac{\cos\theta}{\cancel{\sin\theta}} \cdot \cancel{\sin\theta}$

$\cos\theta$

$\frac{1}{2}\left(\frac{3}{6} + \frac{2}{4} - 2\left(\frac{1}{2}\right)\right)$

$\frac{1}{2}(1 - 1)$

0

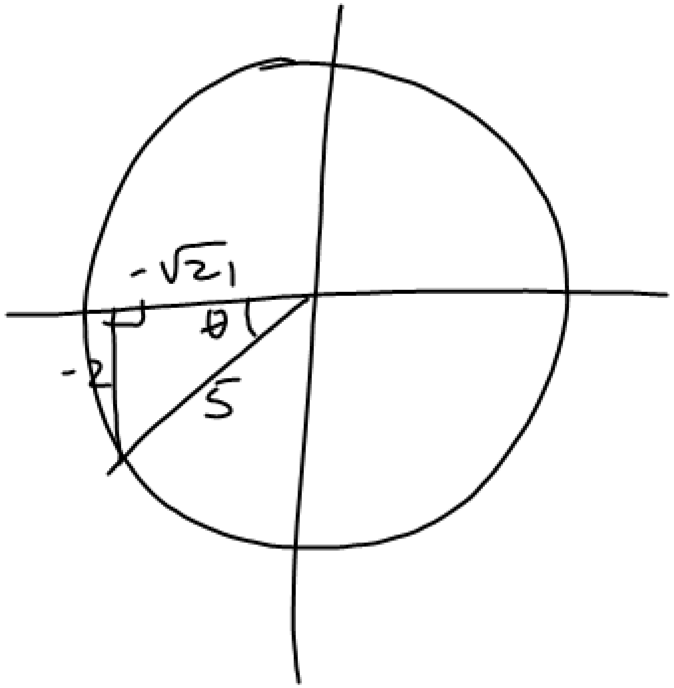
(50) $\sec\theta\cot\theta\sin\theta = \frac{1}{\cancel{\cos\theta}} \cdot \frac{\cancel{\cos\theta}}{\cancel{\sin\theta}} \cdot \frac{\cancel{\sin\theta}}{1}$

$\frac{1}{1}$

(24) $\csc\theta = -\frac{5}{2}$ in Quad III

$\downarrow$

$\frac{r}{y}$



$\sin\theta = -\frac{2}{5}$

$\cos\theta = -\frac{\sqrt{21}}{5}$

$\tan\theta = \frac{2}{\sqrt{21}} = \frac{2\sqrt{21}}{21}$

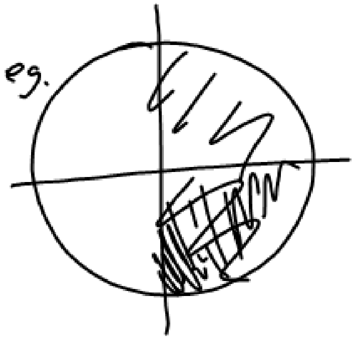
$\cot\theta = \frac{\sqrt{21}}{2}$

$\sec\theta = -\frac{5}{\sqrt{21}} = \frac{5\sqrt{21}}{21}$

7 $\cos(-s) = \cos(s) = \frac{\sqrt{5}}{5}$

$\tan s < 0$

tan neg.



$\sin^2 x + \cos^2 x = 1$

$\sin^2 x + \left(\frac{\sqrt{5}}{5}\right)^2 = 1$

$\sin^2 x + \frac{5}{25} = 1$

$\sin^2 x + \frac{1}{5} = 1$

$\sin^2 x = 1 - \frac{1}{5}$

$\sin^2 x = \frac{4}{5}$

$\sin x = \frac{2}{\sqrt{5}} = -\frac{2\sqrt{5}}{5}$

43 write $\sin x$ interms of $\cos x$

$$\sin^2 x + \cos^2 x = 1$$

$$\sin^2 x = 1 - \cos^2 x$$

$$\boxed{\sin x = \pm\sqrt{1-\cos^2 x}}$$

cot x in terms of sin x

$$\cot^2 x + 1 = \csc^2 x$$

$$\cot^2 x + 1 = \frac{1}{\sin^2 x}$$

$$\cot^2 x = \frac{1}{\sin^2 x} - 1$$

$$\boxed{\cot x = \pm\sqrt{\frac{1}{\sin^2 x} - 1}} \Longrightarrow \cot x = \pm\sqrt{\frac{1-\sin^2 x}{\sin^2 x}}$$

49

$\cot\theta \sin\theta$

$\cot = \frac{\cos\theta}{\cancel{\sin\theta}} \cdot \frac{\cancel{\sin\theta}}{1}$

$\cos\theta$

50

$\sec\theta \cot\theta \sin\theta$

$\left(\frac{1}{\cancel{\cos\theta}}\right)\left(\frac{\cancel{\cos\theta}}{\cancel{\sin\theta}}\right)\left(\frac{\cancel{\sin\theta}}{1}\right) =$

$= 1/1 = 1$

51 $\cos\theta \csc\theta$

$\csc\theta \rightarrow \dfrac{1}{\sin\theta}$

$\cos\theta \cdot \dfrac{1}{\sin\theta}$

$\dfrac{\cos\theta}{\sin\theta} = \boxed{\cot\theta}$

52 $\cot^2\theta\,(1+\tan^2\theta)$

$\dfrac{\cos^2\theta}{\sin^2\theta}\left(1+\dfrac{\sin^2\theta}{\cos^2\theta}\right) =$

$\cot^2 + 1 = \csc^2$

53. $\sin^2\theta\,(\csc^2\theta - 1)$

$\sin^2\theta \cot^2\theta$

$\sin^2\theta\left(\dfrac{\cos^2\theta}{\sin^2\theta}\right)$

$\dfrac{\sin^2\theta\cos^2\theta}{\sin^2\theta}$

$\cos^2\theta$

52

$\cot^2\theta(1+\tan^2\theta)$

$\cot^2\theta \cdot \sec^2\theta$

$\cot^2\theta \cdot \sec^2\theta$

$\frac{\cancel{\cos^2\theta}}{\sin^2\theta} \cdot \frac{1}{\cancel{\cos^2\theta}} = \frac{1}{\sin^2\theta} = \csc^2\theta$

53)

$$\sin^2\theta(\csc^2\theta - 1) = \sin^2\theta\left(\frac{1}{\sin^2\theta} - 1\right)$$

$$= \frac{\cancel{\sin^2\theta}}{\cancel{\sin^2\theta}} - \sin^2\theta$$

$$1 - \sin^2\theta =$$

$$\cos^2\theta + \sin^2\theta = 1$$
$$-\sin^2\theta = 1 - \sin^2\theta$$

$$\cos^2\theta$$

54) $(\sec\theta - 1)(\sec\theta + 1)$

$\sec^2\theta - \cancel{1\sec\theta} + \cancel{1\sec\theta} - 1$

$\sec^2\theta - 1$

$\tan^2\theta + 1 = \sec^2\theta$

$\quad\quad\quad\quad -1 \quad\quad -1$

$\boxed{\tan^2\theta} = \sec^2 - 1$

55) $(1-\cos\theta)(1+\sec\theta)$

$1 \cdot 1 = 1$

$1 \cdot \sec\theta = \sec\theta$

$-\cos\theta \cdot \frac{1}{\cos\theta} = -1$

$-\cos\theta \cdot 1 = -\cos\theta$

$\cancel{1} \cancel{-1} - \cos\theta + \sec\theta$

$\sec\theta - \cos\theta$

56

$$\frac{\cos(x)+\sin(x)}{\sin(x)}$$

$$\frac{\cos(x)}{\sin(x)} + \frac{\cancel{\sin(x)}}{\sin(x)}$$

$$\frac{\cos(x)}{\sin(x)} + 1$$

$$\boxed{\cot(x)+1}$$

57

$$\frac{\cos^2 x - \sin^2 x}{\sin x \cos x}$$

$$\frac{\cos^{\cancel{2}} x}{\sin x \cancel{\cos x}} - \frac{\sin^{\cancel{2}} x}{\cancel{\sin x} \cos x}$$

$\cos x \cdot \cancel{\cos x}$

$$\frac{\cos x}{\sin x} - \frac{\sin x}{\cos x}$$

$$\cot x - \tan x$$

$$\cot x + 1 \stackrel{?}{=} \csc x(\cos x + \sin x)$$

$$\csc x \cos x + \csc x \sin x$$

$$\frac{1}{\sin x} \cdot \frac{\cos x}{1} + \frac{1}{\sin x} \cdot \frac{\sin x}{1}$$

$$\frac{\cos x}{\sin x} + \frac{\cancel{\sin x}}{\cancel{\sin x}}$$

$$\cot x + 1$$

Do Not

Solve

No moving things from one side to the other

Hints for verifying trig identities:

① Be aware of alternate forms of the identities

$\sin^2 x + \cos^2 x = 1$ may show up as $\sin^2 x = 1 - \cos^2 x$
or $\cos^2 x = 1 - \sin^2 x$

② It is sometimes helpful to rewrite all functions in terms of sine and cosine

③ Usually any factoring or indicated operations should be performed

For example $\sin^2 x + 2\sin x + 1 \rightarrow (\sin x + 1)^2$
$\sin^2 x - 1 \rightarrow (\sin x - 1)(\sin x + 1)$

or $\frac{1}{\sin\theta} + \frac{1}{\cos\theta} = \frac{\cos\theta}{\sin\theta\cos\theta} + \frac{\sin\theta}{\sin\theta\cos\theta} = \frac{\cos\theta + \sin\theta}{\sin\theta\cos\theta}$

you may also find it helpful to go the other way and split it up.

④ watch for difference of squares possibilities.

An expression containing $1+\sin x$ may be simplified by multiplying by $1-\sin x$ to get $1-\sin^2 x$ which can be substituted by $\cos^2 x$

⑤ Work on the more complex side and keep goal in mind

⑥ If something is squared – think pythagorean Ident.

Verify each identity

① $\tan^2 x\,(1+\cot^2 x) = \dfrac{1}{1-\sin^2 x}$

② $\dfrac{\tan x - \cot x}{\sin x \cos x} = \sec^2 x - \csc^2 x$

③ $\dfrac{\cos x}{1-\sin x} = \dfrac{1+\sin x}{\cos x}$

④ $\dfrac{\sec x + \tan x}{\sec x - \tan x} = \dfrac{1+2\sin x+\sin^2 x}{\cos^2 x}$